LISTING OF THE CLAIMS

1. (Previously Presented) A bone fixation apparatus for a rod system comprising:

a bone anchor having a proximal end for engaging a driving device and a distal end for engaging a bone;

a rod having a diameter defining a first dimension;

a housing coupled to said proximal end of said bone anchor having opposed spaced-apart flanges extending longitudinally defining a channel therebetween for receiving said rod, said flanges having an outer surface and an inner surface having female threads at a portion therein;

a locking assembly for locking said rod to said housing in contact with said proximal end of said bone anchor;

wherein said locking assembly further comprises an upper cap and a lower cap joined by a post and rotatable relative one to the other, wherein said upper cap is a generally cylindrical member having an outer surface containing at least a portion of male threads thereon and an inner cavity and an upper surface and a lower surface and wherein said inner cavity further comprises an opening to receive said post; and wherein said lower cap comprises an upper surface and a first lower semi-cylindrical surface for engaging said rod;

an extension member extending radially from said lower cap, wherein said extension member has a second lower semi-cylindrical surface, and wherein said extension member has a width that is substantially similar to said first dimension;

wherein said post is provided with an outer perimeter with a first profile and said opening is provided with a second profile that is geometrically similar; and

wherein said rod is insertable into said channel of said housing and said locking assembly is thereafter insertable into said channel of said housing, and wherein a driving instrument is insertable into said inner cavity of said upper cap and rotates said upper cap relative to said lower cap about said post,

thereby engaging said at least a portion of male threads with said female threads, thus causing said locking assembly to translate longitudinally toward said distal end of said anchor into a forcing relationship with said rod, thus forcing said rod into locking relationship with said proximal end of said anchor; and

wherein said threads on said upper cap and said threads in said flanges further comprise at least one start thread timed to properly engage each other when said extension is located within said channel.

2. (Original) The bone fixation system of claim 1 wherein said bone anchor is a screw.

3. (Original) The bone fixation apparatus of claim 2 wherein said housing is fixed to said proximal end of said bone anchor so as to prevent angulation of said bone anchor.

4. (Currently Amended) The bone fixation system of claim 3 wherein said ~~lower cap further comprises an~~ extension member ~~of said lower semi-cylindrical surface~~ is dimensioned to only reside within said channel.

5. (Canceled)

6. (Original) The bone fixation system of claim 1 wherein said bone anchor is a hook.

7. (Original) The bone fixation apparatus of claim 6 wherein said housing is fixed to said proximal end of said hook so as to prevent angulation thereof.

8. (Currently Amended) The bone fixation system of claim 7 wherein said ~~lower cap further comprises an~~ extension member ~~of said lower semi-cylindrical surface~~ is dimensioned to only reside within said channel.

9. (Canceled)

10. (Currently Amended) The bone fixation system of claim 1 wherein said bone anchor is a polyaxial screw further comprising a head disposed at said ~~distal~~ proximal

end having a conic or aspheric upper surface and a partially spherical lower surface and defining a periphery at a junction of said upper and lower surfaces.

11. (Currently Amended) The bone fixation system of claim 10 wherein said ~~lower cap further comprises an~~ extension member ~~of said lower semi-cylindrical surface~~ is dimensioned to only reside within said channel.

12. (Canceled)

13. (Currently Amended) The bone fixation system of claim 1[[1]]0 wherein said proximal end of said polyaxial screw further comprises a depression disposed about said periphery.

14. (Currently Amended) The bone fixation system of claim 1[[1]]3 wherein said inner surface of said flanges further comprise a[[n]] fixed appurtenance projecting substantially radially inwardly.

15. (Currently Amended) The bone fixation system of claim 1[[1]]4 wherein said polyaxial screw is removable from said housing when said depression aligns with said appurtenance, but is not removable when said depression is not aligned with said appurtenance.

16. (Withdrawn) A bone fixation apparatus for a rod system comprising:

a bone anchor having a proximal end for engagement with a driving device and a distal end for engagement with a bone;

a housing coupled to said proximal end of said bone anchor having opposed spaced-apart flanges extending longitudinally and having a channel therebetween to receive a surgical rod therein, each flange having an outer surface and an inner surface and an undercut within said inner surface;

a locking assembly for locking said surgical rod to said housing in contact with said proximal end of said bone anchor, further comprising an upper cap and a lower cap joined by a post and rotatable relative one to the other, wherein said upper cap is a generally cylindrical member having an outer surface and an inner cavity and an upper surface and a lower surface having camming surfaces thereon and wherein said inner cavity further comprises an opening to receive said post;

wherein said outer surface has a first wing and a second wing projecting radially outwardly therefrom for insertion into said undercut to prevent removal of said locking assembly; and

wherein said lower cap further comprises an upper surface having camming surfaces thereon for engagement with said camming surfaces of said upper cap and a lower semi-cylindrical surface for engaging said rod;

wherein said rod is insertable into said channel of said housing and said locking assembly is thereafter insertable into said channel of said housing, and wherein a driving instrument is insertable into said inner cavity of said upper cap and rotates said upper cap relative to said lower cap about said post, thereby moving said camming surfaces of said upper cap relative to said camming surfaces of said lower cap, thus causing said lower cap to translate longitudinally toward said distal end of said anchor into a forcing relationship with said rod, thus forcing said rod into a locking relationship with said proximal end of said anchor.

17. (Withdrawn) The bone fixation apparatus of claim 16 wherein said bone anchor is a screw.

18. (Withdrawn) The bone fixation apparatus of claim 17 wherein said housing is fixed to said proximal end of said bone anchor so as to prevent angulation of said bone anchor.

19. (Withdrawn) The bone fixation apparatus of claim 18 wherein said undercut further comprises a slot adjacent thereto disposed radially outwardly of said undercut having an inner surface and an outer surface and longitudinal dimension greater than that of said undercut.

20. (Withdrawn) The bone fixation apparatus of claim 19 wherein said first wing and said second wing further comprise ridges located outwardly thereof.

21. (Withdrawn) The bone fixation apparatus of claim 20 wherein said ridges engage said inner surfaces of said slots in said flanges to prevent splaying.

22. (Withdrawn) The bone fixation apparatus of claim 21 wherein said post further comprises a first timing groove and a second timing groove disposed longitudinally thereon.

23. (Withdrawn) The bone fixation apparatus of claim 22 wherein said upper cap further comprises a projection in said opening.

24. (Withdrawn) The bone fixation apparatus of claim 23 wherein said upper cap and said first and second timing grooves are timed such that said projection mates with said first timing groove when said locking assembly is in an unlocked position and mates with said second timing groove when said locking assembly is rotated to a locked position.

25. (Withdrawn) The bone fixation apparatus of claim 24 wherein said upper cap further comprises a stop disposed adjacent said upper surface thereof and projecting

radially outwardly from said outer surface of said upper cap, said stop being located out of phase with said wings.

26. (Withdrawn) The bone fixation apparatus of claim 25 wherein said housing further comprises a depression disposed about said inner surface of said flanges.

27. (Withdrawn) The bone fixation apparatus of claim 26 wherein said stop engages said depression when said upper cap is rotated into a locked position.

28. (Withdrawn) The bone fixation apparatus of claim 16 wherein said bone anchor is a hook.

29. (Withdrawn) The bone fixation apparatus of claim 28 wherein said housing is fixed to said proximal end of said bone anchor so as to prevent angulation of said bone anchor.

30. (Withdrawn) The bone fixation apparatus of claim 29 wherein said undercut further comprises a slot adjacent thereto disposed radially outwardly of said undercut having an inner surface and an outer surface and longitudinal dimension greater than that of said undercut.

31. (Withdrawn) The bone fixation apparatus of claim 30 wherein said first wing and said second wing further comprise ridges located outwardly thereof.

32. (Withdrawn) The bone fixation apparatus of claim 31 wherein said ridges engage said inner surfaces of said slots in said flanges to prevent splaying.

33. (Withdrawn) The bone fixation apparatus of claim 32 wherein said post further comprises a first timing groove and a second timing groove disposed longitudinally thereon.

34. (Withdrawn) The bone fixation apparatus of claim 33 wherein said upper cap further comprises a projection in said opening.

35. (Withdrawn) The bone fixation apparatus of claim 34 wherein said upper cap and said first and second timing grooves are timed such that said projection mates with said first timing groove when said locking assembly is in an unlocked position and mates with said second timing groove when said locking assembly is rotated to a locked position.

36. (Withdrawn) The bone fixation apparatus of claim 35 wherein said upper cap further comprises a stop disposed adjacent said upper surface thereof and projecting radially outwardly from said outer surface of said upper cap, said stop being located out of phase with said wings.

37. (Withdrawn) The bone fixation apparatus of claim 36 wherein said housing further comprises a depression disposed about said inner surface of said flanges.

38. (Withdrawn) The bone fixation apparatus of claim 37 wherein said stop engages said depression when said upper cap is rotated into a locked position.

39. (Withdrawn) The bone fixation apparatus of claim 17 wherein said housing further comprises a separable body for lockable attachment to said proximal end of said screw.

40. (Withdrawn) The bone fixation apparatus of claim 39 wherein said separable body further comprises an upper portion having an outer diameter and an inner diameter and a lower portion having an outer diameter and an inner diameter and wherein said outer diameter of said lower portion is less than said outer diameter of said upper portion.

41. (Withdrawn) The bone fixation apparatus of claim 40 wherein said lower portion further comprises fingers oriented longitudinally and extending from said upper portion terminating at a distal end, wherein said fingers receive said proximal end of said screw in varying orientations.

42. (Withdrawn) The bone fixation apparatus of claim 41 wherein said distal end of said fingers define an inner diameter and an outer diameter.

43. (Withdrawn) The bone fixation apparatus of claim 42 wherein said lower portion further comprises a ring disposed externally on said fingers and slideable from an unlocked position to a locked position.

44. (Withdrawn) The bone fixation apparatus of claim 43 wherein said inner diameter of said ring at a bottom end thereof is slightly less than said outer diameter of said fingers such that as said ring is slid from said unlocked position to said locked position, said ring imparts a radial force on said fingers, thus locking said proximal end of said screw in a given orientation.

45. (Withdrawn) The bone fixation apparatus of claim 44 wherein said undercut further comprises a slot adjacent thereto disposed radially outwardly of said undercut having an inner surface and an outer surface and longitudinal dimension greater than that of said undercut.

46. (Withdrawn) The bone fixation apparatus of claim 45 wherein said first wing and said second wing further comprise ridges located outwardly thereof.

47. (Withdrawn) The bone fixation apparatus of claim 46 wherein said ridges engage said inner surfaces of said slots in said flanges to prevent splaying.

48. (Withdrawn) The bone fixation apparatus of claim 47 wherein said post further comprises a first timing groove and a second timing groove disposed longitudinally thereon.

49. (Withdrawn) The bone fixation apparatus of claim 48 wherein said upper cap further comprises a projection in said opening.

50. (Withdrawn) The bone fixation apparatus of claim 49 wherein said upper cap and said first and second timing grooves are timed such that said projection mates with said first timing groove when said locking assembly is in an unlocked position and mates with said second timing groove when said locking assembly is rotated to a locked position.

51. (Withdrawn) The bone fixation apparatus of claim 50 wherein said upper cap further comprises a stop disposed adjacent said upper surface thereof and projecting radially outwardly from, said outer surface of said upper cap, said stop being located out of phase with said wings.

52. (Withdrawn) The bone fixation apparatus of claim 51 wherein said housing further comprises a depression disposed about said inner surface of said flanges.

53. (Withdrawn) The bone fixation apparatus of claim 52 wherein said stop engages said depression when said upper cap is rotated into a locked position.

54. (Withdrawn) A bone fixation apparatus for a rod system comprising:

a bone anchor having a proximal end for engagement with a driving device and a distal end for engagement with a bone;

a housing coupled to said proximal end of said bone anchor having opposed spaced-apart flanges extending longitudinally and having a channel therebetween to receive a surgical rod therein, each flange having an outer surface and an inner surface, said outer surface having a circumferential groove therein;

a locking assembly for locking said surgical rod to said housing in contact with said proximal end of said bone anchor, further comprising an upper cap and a lower cap joined by a post and rotatable relative one to the other, wherein said upper cap is a generally cylindrical member having an outer surface and an inner cavity and an upper surface and a lower surface having camming surfaces thereon and wherein said inner cavity further comprises an opening to receive said post;

wherein said outer surface has a first wing and a second wing projecting radially outwardly therefrom for insertion into said circumferential groove in said outer surface of said housing to prevent removal of said locking assembly; and

wherein said lower cap further comprises an upper surface having camming surfaces thereon for engagement with said camming surfaces of said upper cap and a lower semi-cylindrical surface for engaging said rod;

wherein said rod is insertable into said channel of said housing and said locking assembly is thereafter insertable into said channel of said housing, and wherein a driving instrument is insertable into said inner cavity of said upper cap and rotates said upper cap relative to said lower cap about said post, thereby moving said camming surfaces of said upper cap relative to said camming surfaces of said lower cap, thus causing said lower cap to translate longitudinally toward said distal end of said anchor into a forcing relationship

with said rod, thus forcing said rod into a locking relationship with said proximal end of said anchor.

55. (Currently Amended) A bone fixation apparatus for a rod system comprising:

a rod;

a bone anchor having a first end for engaging bone, and a second end having a housing;

said housing is provided with opposed spaced-apart flanges defining a channel therebetween for receiving said rod;

a locking assembly having an upper cap and a lower cap;

said flanges having an outer surface, and an inner surface having female threads for threadedly receiving said locking assembly;

said lower cap having a first end with a concave profile that matingly engages said rod in one of two possible orientations, an extension member, and a second end having a post, said post having an outer perimeter with a first profile; wherein said extension member has a width that is substantially equal to a diameter of said rod; and wherein said extension member protrudes from ~~other structure of~~ said lower cap;

said upper cap having a first end, a second end, an outer surface, and an opening through said first end and said second end, ~~and~~ said outer surface having one or more portions of male threads, said opening having an interior surface forming a second profile;

wherein said first profile and said second profile are geometrically similar; and

wherein no more than two orientations of said second profile relative to said first profile allows said upper cap to be received in said housing.

56. (Currently Amend) The bone fixation apparatus for a rod system of claim 55, wherein said post is symmetric about a longitudinal axis, said longitudinal axis extending longitudinally and centrally through said post.

57. (Currently Amend) The bone fixation apparatus for a rod system of claim 55, wherein said post is symmetric about a longitudinal plane, said longitudinal plane extending through the entirety of a longitudinal axis extending longitudinally and centrally through said post.

58. (Currently Amend) The bone fixation apparatus for a rod system of claim 55, wherein said post is asymmetric about a longitudinal axis, said longitudinal axis extending longitudinally and centrally through said post.

59. (Currently Amend) The bone fixation apparatus for a rod system of claim 55, wherein said post is asymmetric about a longitudinal plane, said longitudinal plane extending through the entirety of a longitudinal axis extending longitudinally and centrally through said post.

60. (Canceled)

61. (Previously Presented) The bone fixation apparatus for a rod system of claim 55, wherein said one or two orientations are also proper orientations to align said male threads with said female threads.

62. (Currently Amended) A bone fixation apparatus for a rod system comprising:

a bone anchor having a first end for engaging bone, and a second end having a housing having an interior surface, wherein said interior surface is provided with female threads, and wherein said housing has a groove;

a locking assembly having an upper cap and a lower cap;

an extension member extending from said lower cap, said extension member having a width substantially similar to a width of said groove; ~~wherein said extension member protrudes from other structure of said lower cap;~~

said housing axially receiving said locking assembly, wherein said lower cap is received within said housing in no more than two orientations;

said lower cap having a first end, and a second end, said second end having a post protruding therefrom;

said upper cap having a first end, a second end, an outer surface, and an opening through said first and second end, and said outer surface having one or more portions of male threads;

wherein one or two orientations of said opening relative to said extension member allows said upper cap to be axially received in said housing.

63. (Currently Amended) The bone fixation apparatus for a rod system of claim 62, wherein said post is symmetric about a longitudinal axis, said longitudinal axis extending longitudinally and centrally through said post.

64. (Currently Amended) The bone fixation apparatus for a rod system of claim 62, wherein said post is symmetric about a longitudinal plane, said longitudinal plane extending through the entirety of a longitudinal axis extending longitudinally and centrally through said post.

65. (Currently Amended) The bone fixation apparatus for a rod system of claim 62, wherein said post is asymmetric about a longitudinal axis, said longitudinal axis extending longitudinally and centrally through said post.

66. (Currently Amended) The bone fixation apparatus for a rod system of claim 62, wherein said post is asymmetric about a longitudinal plane, said longitudinal plane extending through the entirety of a longitudinal axis extending longitudinally and centrally through said post.

67. (Previously Presented) The bone fixation apparatus for a rod system of claim 62, wherein said one or two orientations are also proper orientations to align said male threads with said female threads.

68. (Currently Amended) A bone fixation apparatus for a rod system comprising:

a rod having a first dimension;

a bone anchor having a first end for engaging bone, and a second end having a housing provided with an interior surface, wherein said interior surface is provided with female threads;

a locking assembly having an upper cap and a lower cap;

said housing axially receiving said locking assembly,

said lower cap having a first end and a second end; wherein said first end is provided with a first orientation means for providing proper orientation between said housing and said lower cap, said second end is provided with a second orientation means for providing proper orientation between said lower cap and said upper cap, said second orientation means having an uninterrupted periphery;

said first orientation means having a second dimension, wherein said first dimension is substantially equal to said second dimension;

said upper cap having an outer surface and an opening, wherein said opening matingly engages said second orientation means, and said outer surface is provided with one or more portions of male threads; and

wherein when said first orientation means is properly oriented with respect to said housing and said upper cap opening is properly oriented with respect to said second orientation means, said male threads will align with said female threads to prevent cross threading.